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**THE ROLE OF URBAN TRANSPORT IN
SUSTAINABLE HUMAN SETTLEMENTS DEVELOPMENT**

BACKGROUND PAPER NO. 7

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Urban Transport, Human Settlements and Social Development



A. The Role of Urban Transport in Sustainable Human Settlements Development

The rapid urbanization occurring across much of the globe means that not only that more people than ever before will be living and working in cities but also that more people and more goods will be making more trips in urban areas, often over longer and longer distances. How cities, and especially, how rapidly growing cities in developing countries meet the increased demand for urban transport has profound implications for the global environment and the economic productivity of human settlements.

Cities represent a spatial organization of functions to meet human needs. The value of this spatial organization depends, to a large extent, on the capacity to facilitate interactions, by arranging effective patterns of physical development and by providing for the efficient movement of goods and people. By allowing access to employment opportunities, housing quarters and services, the transport sector meets basic human needs and, by affecting the exchange of raw materials and finished products, it supports diversification and strengthens the economy. However, meeting the demand for transport involves high costs which bear heavily on public spending, business expenditures and family budgets, competing for resources needed for the achievement of other developmental objectives. Expenditures on transport affect, in particular, low-income-family budgets, adding the poverty burden.

Additionally, transport has substantial impacts on global life-support systems, non-renewable resource consumption, sustainability of production of renewable resources, living conditions and human health and safety:

- (a) Global life-support systems can be significantly affected by transport-related emission of carbon dioxide and methane which contribute to the "greenhouse" effect. Vehicle emissions of carbon monoxide, hydrocarbons and nitrogen oxides reduce oxidation, i.e. the cleansing efficiency of the atmosphere.
- (b) Transport consumes about 40 per cent of commercial energy in the developed countries mainly responsible for the world's total energy use in transport. In developing countries, with low levels of industrial development, the share of transport in commercial energy consumption is, often even higher, reaching 80 to 90 per cent.
- (c) Transport exerts a demand on land for the construction of infrastructure; and the production of vehicles and the construction of transport infrastructure require significant quantities of mineral and other natural resources with limited possibility of re-use.

- (d) Transport affects sustainability of renewable-resource production because emissions of nitrogen and sulfur oxides lead to atmospheric acidity which cause water and soil pollution, degradation of vegetation and a decrease in agricultural and forestry outputs. Furthermore, there is an impact of transport -related emissions through corrosion damage to building materials.
- (e) Gaseous and particulate emissions from vehicles, using fossil fuels, create smog and excessive concentrations of carbon monoxide, nitrogen oxides and lead. The movement of vehicles is also the main source of noise pollution. These phenomena affect, directly or indirectly, physical and mental health of all urban residents.
- (f) Construction of the transport infrastructure often disrupts neighborhoods; it relocates urban residents to the periphery increasing their travel distances and expenditures; it decreases safety; it degrades the amenity of public open spaces and creates visual intrusions. Yet inadequate or unaffordable transport leads to excessive building and population densities, causing deterioration of the living environment.

In the context of sustainable urban development, the crucial transport issue is how to make social and economic progress possible with the least damage to the natural and built environments, while saving non-renewable resources and ensuring equity in distribution of transport costs and benefits.

B. Transport strategies which enhance social and economic development

To be managed and developed in compliance with the principles of sustainable development, appropriate transport planning requires the adoption of long-range strategies which should be established on an inter-sectoral basis as the issues involved pertain not only to regional-development but also to land-use, industrial, energy and fiscal planning. This planning must be carried out at sub-national and local scales and linked to national policies to provide the most appropriate framework for devising such strategies. Only in this framework is it possible to reconcile requirements for transport and the standards against the adverse effects of transport-infrastructure installation and operation. Indeed, the demand for transport and the ways in which it can be met depend to a large extent on how human settlements are managed.

When devising transport strategies compatible with the objectives of sustainable development within human settlements, it is necessary to consider three issues simultaneously:

- (a) The indispensable level of transport provision to meet required social-economic development objectives. This analysis should include clearly establishing exactly what kind of transport facilities and services should be provided to bring about this development within the desired limits of resource use.
- (b) Developing and managing the transport sector while not simultaneously undermining the sustainability of other sectors of the economy.
- (c) Organizing and planning for the human settlements system and patterns of individual settlement development to sustain transport and reduce its costs; its impacts on human health; and its demand for non-renewable resources.

Such an integrated approach to devising transport strategies has not typically been a common practice. Overall policies on transport in human settlements are usually completely lacking, and transport planning at local levels tends to adopt, for the sake of simplicity, a strictly sectoral approach. Transport plans attempt to respond to the predicted demand for travel if possible in its entirety, but

this future travel demand is derived from models which transpose, into the future, present travel behavior and accepted tendencies in settlement development. Broad social, economic and environmental objectives which are often beyond the concern of transport planning, are not normally taken into account.

The integrated approach significantly increases the complexity of planning in technical and decision-making aspects. However, it opens great possibilities for guiding development in a more sustainable way. Nevertheless, to be effective, integrated planning needs close interagency co-operation and strong urban management in general. This will be extremely difficult to achieve in developing countries where institutions tend to be very weak. Considerable efforts will have to be made to upgrade skills and improve management systems.

Ready-made strategies cannot be proposed, owing to the diversity of conditions and problems in developed and developing countries, but the following lines of action deserve to be considered:

- (a) Modifying and managing the demand for transport, including making changes in travel behavior;
- (b) Making modal composition in transport supportive of sustainable development;
- (c) Improving vehicles and fuel technologies
- (d) Controlling the impacts of investment projects in transport on the quality of life;
- (e) Increasing the efficiency of existing transport operations;
- (f) Improving the maintenance of existing infrastructure and of vehicle in use.

These lines of action can be fully effective only if they are well coordinated and undertaken simultaneously. The optimum combination of options is essential, as they usually have synergistic links. For example, where each individual action on its own might have modest impact at best, joint actions might achieve considerable benefits. To be implemented, strategies must have the support of the general public, which make public participation in their formulation essential and requires the raising of public awareness of the ecological impacts of transport. At the same time, substantial international co-operation is needed in promoting environmentally-friendly transport technologies. Any program designed to improve transport must identify measures of improvement and establish a means for monitoring progress. This requires the development of a means of monitoring impacts on resource use, social conditions and human health more sensitively than is currently achieved by simple economic analyses of transport programs.

C. Reducing the demand for transport

Transport represents an imperfect market in which the costs borne by users of transport services and infrastructure neither reflect fully social, economic and, in particular, ecological costs of transport nor distribute these cost among users in an equitable way. This results in individual travel behavior and location decisions which increase the demand for transport above real needs and lead to an inefficient use of limited natural resources and to inevitable adverse ecological impacts. Therefore, there is a need to manage the demand for transport by applying policies which will create conditions for the users of transport such that their behaviors becomes compatible with principles of sustainability.

Transport needs can be reduced and satisfied by lower costs and with lessened impact on the environment by applying strategies which result in a spatial distribution of activities which shortens travel distances and prevents excessive concentration of the demand for transport. In this context, the importance of subnational development planning and local land-use planning should be fully

recognized. This particularly pertains to developing countries wherein planning tools can be potentially effective if they are geared realistically to the current processes of structural transformation which subnational areas and settlements are undergoing due to globalization.

Subnational development planning should aim at the distribution of population and economic activities which prevents spatial concentration of the demand for transport to the point where the level of loading of the environment by transport-related pollution will endanger ecological sustainability. In the use of settlement land, single-purpose zoning patterns should be avoided, and, instead, urban areas should be structured in the form of medium-sized, relatively self-contained modules which will meet the needs of different social-economic groups and allow people's homes and places of work to be within walking distance. However, to achieve this, a substantial improvement in urban management institutions is indispensable.

Unlimited mobility and unrestrained choice of mode of travel cannot be ensured in any but the smallest settlements. Therefore, transport networks should be developed for the benefit of all sections of the community in such a way that indispensable access to employment opportunities, housing opportunities and services is ensured for all, while freedom of choice in route and mode of travel can be restrained for the sake of sustainability. Freedom of car traffic should be restrained, in particular, in the centers of large cities, in recreation zones and in other environmentally sensitive areas.

The complexities of transport development and operation and the imperfection of transport markets lead to costs and benefits of transport being unequally distributed. This is particularly the case with people who have access to private cars at the expense of others. Therefore, fiscal policies and other economic measures should enhance efficiency in transport, discourage excessive use of cars and make car-users pay the economic and environmental costs of their travel. At the same time, environmental-friendly travel behavior should be encouraged by raising awareness of transport-related environmental impacts and providing education on energy-efficient driving habits.

D. Reducing the Overuse of the Private Automobile to Meet Future Travel Needs

The detrimental effects of the activities of the transport sector on the biosphere, including consumption of energy resources, are mainly related to road transport. The economic efficiency and environmental quality of large cities are particularly affected by transport based on the massive use of cars and more recently, also by the use of motorcycles. Although individual transport has numerous advantages in flexibility, speed, privacy and comfort of travel, these advantages should be weighed against their impact on energy consumption and land use, including the role of individual transport plays in encouraging land-absorbing and energy-inefficient physical development patterns. In the conditions of large cities, the need for passenger accessibility and mobility should be largely met by public-transport, and non-motorized transport modes which consume less energy and emit fewer pollutants per passenger-kilometer than private modes. Additionally, these modes are more economical in their use of travel-way space and support higher urban-development densities.

Development of public transport should lead to the establishment of transport networks made up of a diversity of modes that are compatible with travel needs and affordable by the entire population. Progress will require flexible transport-development strategies, particularly in the conditions of uncertainty concerning development prospects prevailing in cities in developing countries. Travel-way space for exclusive use of public transport should be created or reallocated from automobiles to public transport, whenever the latter solution is feasible. The use of this space, i.e. the choice of a public-transport mode or mix of modes, should be appropriate to local conditions, reflecting, *inter alia*, financial affordability of mode installation and operation, its economic viability, its expected

impact on the transport network, the sustainability of the urban structure and any socially distributive effects.

Buses are likely to retain an essential share in public transport; thus, there is the need to improve the operation, maintenance and management practices of bus transport and reduce its contaminant effects and, where feasible, promote the use of electric trolleybuses and trams. Also, paratransit should retain a substantial role in public transport, in particular in developing countries. Regulation of paratransit by governments should focus on safety and on environmental requirements, while not impeding paratransit operation or limiting entry to the market, with the exception of transport corridors heavily loaded and well served by buses. Rail-bound high-capacity public-transport modes might become indispensable in very large cities with strong and intensively developed centers: these modes are also preferable for environmental reasons. Capital operating costs are, however, usually restrictive, and such modes can only be developed if high economic and environmental benefits can be achieved: in this connection, innovative methods of environmental cost/benefit analysis should be developed to capture all the facts involved in decision-making on these modes.

In the pursuit of transport policies reflecting sustainable development, the promotion of walking and cycling can be important. The bicycle is by far the most energy-effective means of passenger transport and most affordable for the urban and rural poor. Adequate attention should be given to the provision of safe cycle routes and parking spaces. Likewise, policies must support walking as a prime mode of transport, thorough the provision and maintenance of walkways.

E. Reduce costs by enhancing transport efficiency

The objective of sustainability calls for making the best use of existing transport networks. Traffic-management measures have brought significant although, often, short-lasting effects. Attention should be directed, therefore, to improvements in public-transport operation. Providing for priority in traffic of public-transport vehicles, at the expense of the free movement of individual transport, is fully justified by principles of equity and sustainability. Special attention should be given to the segregation of public transport from general traffic, and the provision of busways is one promising option.

The objective of a public-transport development strategy is to optimize the effectiveness and efficiency of a multimodal public-transport network. This can be achieved by enhancing modal integration and by ensuring the co-operation of all transport operators. However, this should be done without introducing transport operators. However, this should be done without introducing impediments to competitiveness and the initiative of operators.

F. Urban Transport-Related Human Settlements Policy Recommendations

Policies aimed at bringing transport in human settlements into harmony with principles of sustainable development should respond to national local development objectives and reflect specific local conditions. At the same time, they should contribute to sustainability of development in global dimensions. The following set of recommendations may be of help in devising such policies in both developed and developing countries:

- (a) Subnational development planning and local land-use planning should be deeply concerned with the implications of transport and of transport-related environmental effects; they should be effectively used for decreasing the demand for transport,

preventing its excessive concentration and mitigating its ecological impacts, e.g. by encouraging compact rather than dispersed development patterns.

- (b) Fiscal policies and other economic instruments should increase the share within the transport modes with high energy-efficiency and low emissions.
- (c) The role of public transport in making urban transport compatible with the requirements of sustainable development should be fully recognized and be adequately reflected in urban transport plans and development programs. High-occupancy public-transport vehicles should be given preferential treatment in traffic-management policies.
- (d) Cycling and walking should be recognized as important components of urban traffic: safe cycleways and footways should be provided, while the attractiveness of these modes of travel should be enhanced by ensuring proximity of work-places and services to residential quarters.
- (e) Appropriate national emission standards of new vehicles and ceilings for emissions from vehicles in use should be established, and systematic control of emission levels by vehicles in use should be introduced.
- (f) Monitoring of the environmental impact of transport should be improved, and studies on the quantitative evaluation of this impact, with regard to various transport modes, should be promoted.
- (g) Research and development on new vehicles and new energy sources, able to replace petroleum fuels, reduce the level of pollutant emissions and increase energy efficiency in transport, should be expended.
- (h) Measures to promote public awareness of the transport-related environmental impact should be undertaken, so as to enhance the development of environment-friendly travel behaviour: education of drivers in vehicle maintenance and operation should be given attention, since it has proved to result insignificant energy savings and lessened pollution.

The transport sector in developed countries bears particular responsibility for the depletion of non-renewable energy resources and damage to the biosphere. Travel behavior and urban development patterns prevailing in these countries are evidently incompatible with the objectives of sustainable development. However, it would be unrealistic to aim at their radical change. To reconcile urban transport with objectives of sustainability, it is recommended that:

- (a) The efficiency of public transport should be increased, and new public-transport systems, able to attract car users, should be developed.
- (b) Users of motorized individual transport modes should pay the full economic and environmental costs of their travel, and appropriate pollution and congestion pricing should be developed for this purpose.
- (c) The use of energy-efficient and low-polluting vehicles and fuels should be encouraged by taxation policies, regulatory and other economic incentive instruments.

- (d) Introduction of emission standards for carbon dioxide and for other not-yet-controlled toxic emissions should be considered. Transport-related noise should be reduced and appropriate noise-reduction standards for the construction of vehicles and infrastructure should be introduced.
- (e) In line with the improvement in public transport, restrictions on car traffic should be imposed in congested and environmentally-sensitive areas.
- (f) Research should be carried out on environmentally sensitive cost/benefit analysis techniques for transport infrastructure investments.

In developing countries, policies on urban transport should respond to the basic needs of the present generation while preserving sustainable options for the future. Recommendations addressed to developing countries are:

- (a) Human settlements management should be strengthened, so as to be able to steer physical development in a way which reduces the demand for transport and prevents damage to the environment. Properly located and well-timed investment in transport infrastructure might be a guiding force to induce development in defined directions.
- (b) Transport modes based on animated energy should be gradually replaced by public-transport modes for long-distance travel.
- (c) Development of affordable, reliable and efficient public transport should be given top priority in urban transport plans and development programs. Coordinated transport and land-use planning should make provision for gradual improvements to public-transport systems, so as to enable them to respond to a fast-growing demand for transport.
- (d) Travelway space should be allocated to public transport and segregation of public transport from general traffic should be promoted in heavily loaded traffic corridors.
- (e) The development of efficient, environment-compatible, high-capacity public-transport modes deserves governmental support which should be granted if it does not undermine the achievement of other important social and economic objectives.
- (f) Wide public/private partnership in the provision of public-transport services should be encouraged.
- (g) Particular attention should be attached to effective traffic management, to efficient operation of public transport and to proper maintenance of the transport infrastructure.
- (h) The growth of car and motorcycle ownership should not be directly or indirectly subsidized. Import tariffs, taxation policies and fuel-pricing policies should be used to prevent, in particular, growth in the number of energy-inefficient, highly polluting types of vehicles.
- (i) Emphasis should be given to training in transport-management skills, so as to build up planning and operating capacities.

International co-operation can be influential in making transport in human settlements compatible with the sustainability goal. It should encompass the following:

- (a) Control of transboundary air pollution resulting from transport.
- (b) Consolidation of environment-protecting standards for production of transport
- (c) Facilitation of environment-friendly transport technologies.
- (d) Establishment of financial mechanisms enabling developing countries to build environmentally friendly public-transport systems on fair financial terms